Fermilab
ES&H Section

MICROWAVE OVEN SAFETY PROCEDURES

2/00

OBJECTIVE

To provide guidance on properly conducting a microwave oven safety survey if the oven has been abused and/or damaged.

DISCUSSION

Microwave ovens can be surveyed at Fermilab to assure they do not present an electrical and sanitation problem as well as possible microwave radiation leakage. The emission limit for microwave ovens is 5 mW/cm^2 at any point on a surface 5 cm from the cabinet, measured with the probe normal to the surface at the point of contact with the spacer cone. The microwave oven survey form parallels the survey procedures and will help you complete the survey properly. After completion of the survey, the information will be entered into a computer file called Microwave Oven Survey Database to facilitate retrieval, manipulation, and report generation.

EQUIPMENT

- Holaday 1501 Survey Meter
- Survey form
- Styrofoam cup
- Microwave Oven Survey Stickers
- Permanent Marker

SURVEY PROCEDURES

1. Enter the survey date, the two-letter code for the division/section controlling the oven, as well as the property location codes and room where the oven is located.

2. Visually inspect the oven for signs of a compromised seal. Is the door loose? Are there dented or broken components? Are there burn marks from arcing? If any damage or looseness is apparent, exercise care to avoid possible over exposure.

3. Check to see that the oven is free of encrusted grease deposits and other accumulated soil. Don't forget the topside of the cavity. The cavity should be clean.

4. Is the oven electrically grounded? Is the electrical cord provided with three prongs? If so, are all three used?

5. Check the battery on the microwave meter.

6. Fill a Styrofoam cup with water and place it in the center of the load-bearing surface. During the test, change the water as necessary to minimize boiling. The cup of water has a dual purpose: a) some ovens are damaged when no load is present; b) the amount of leakage is inversely proportional to the amount of contents in the oven, therefore, only a small load is recommended for leakage testing.

7. Prepare the survey meter in accordance with the IH Manual instructions. Set meter to the 2mW/cm^2 scale. Adjust the zero with the zero knob. If the meter goes off scale adjust to the 10mW/cm^2 scale.

8. NOTE: If at anytime the leakage exceeds 20mW/cm^2, immediately terminate the survey and prohibit use of the oven. This level may be harmful to health and can be immediately damaging to the instrument.

9. CLOSED DOOR LEAK RATE TEST

   If selectable, set the power to the maximum power output. Activate the oven and begin the closed door tests. Record the values and locations of maximum readings on the diagram at the bottom of the page. Also, draw in the position of the handle. If no leakage is detected, mark the diagram with a <0.1 mW/cm^2.

   Door Seal - Probe the entire periphery of the door with the tip of the spacer cone in contact with the oven.

   Door Screen - Probe the entire surface of the door screen with the tip of the spacer cone in contact with the screen.

   Cabinet - Probe the cabinet at all points of possible leakage (i.e., corners, seams (welded, riveted, and bolted), ventilation louvers and power cords.)

   Circle the position that has the greatest power density reading for the oven. If the maximum occurs in more than one position, all such positions should be circled.

10. FAILED INTERLOCK TEST

    This test is intended to detect complete failure of the interlock system. Follow the instructions carefully to minimize possible personal exposure.

    If selectable, set the power to the lowest available continuous setting. Use the shortest available timer setting that will allow the oven to reach the set power

level. With the oven off, open the door approximately 2", blocking it open with a nonconductive object if necessary. Position yourself out of direct line possible emission through the door gap, and as far from the oven as possible that you are still able to reach the controls. Locate the probe in line with the door gap but 1-2 ft from the oven. Position the test meter so that it can be read while activating the oven. Activate the oven. If the instrument meter starts to deflect upscale, turn the oven off immediately. If no upscale deflection occurs, the probe should be moved closer to the door gap to verify that the oven is not operating.

If the oven emits radiation with the door open, prohibit its use immediately.

11. DOOR OPENING LEAK RATE TEST

    If selectable, set the power to the maximum possible output. Activate the oven. Place the probe near the door latch with the tip of the spacer cone in contact with the oven. Slowly open the door until the oven turns off or until an emission level of 20mW/cm^2 is observed, whichever comes first. If the leakage is less than 20 mW/cm^2, open the door to a point just prior to interlock cutoff and scan the door seal to fine the point of maximum leakage. If the door opening leakage rate(s) are greater than the closed door rates, note the value(s), location(s), and door position(s) of maximum readings.

12. Remove the old microwave oven survey sticker, if present, and attach it to the survey form. Fill out a new sticker including the oven sequence number (in the space above the symbol on the right). Attach the new sticker to the oven in a location that is conspicuous but will not interfere with the operation or cleaning of the oven. Note, if a sequence number does not exist, the ES&H Section will provide one upon entry into the Microwave Oven Survey Database.

13. Note the date the unit was calibrated. Include comments in the space provided and sign the form.

14. Send survey forms to the ES&H Section for entry into the Microwave Oven Survey Database.

15. See previous survey reports for guidance on format, content, etc.

MAINTENANCE and REPAIR

Damaged microwave ovens are only to be adjusted or repaired by authorized service representatives. Modifications to microwave ovens are not permitted. If a microwave oven has a damaged door, hinge, latch or sealing surface, the oven must be removed from service until it has been repaired and determined to be safe.

Microwave Oven Survey Form

Seq. _____

FNAL# _____ Oldser _____

Make _____ Model _____ Serial _____

Location _____ Room Desc. _____

Survey Date _____ If Not Surveyed, Why Not _____

Contact Person _____ Div Sec. _____

Sanitary Condition _____

Electrically Grounded _____ Compromised Seal _____

Door Position

Max Open Door Leak Rate mW/cm2 _____ _____

Max Closed Door Leakage Rate mW/cm2 _____ _____

Is Interlock Operational _____

Closed Door Leakage Rate Position

Top _____

Left _____ Right _____

Bottom _____

Follow-up-date _____ Folcomment

_____

Old Comment

_____

Instrument Used For Survey _____ Last Calibration Date _____